A STUDY OF NAVAL DEFENSE POSTURE AGAINST SURPRISE NUCLEAR ATTACK

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by

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the requirements for the degree of

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ABSTRACT

Present defense posture of the naval establishment, particularly the defense posture of ships in port, reveals some inadequacies when evaluated in the environment of an attack without warning. Now that a potential enemy of the United States has intercontinental ballistic missiles and Mach 2-plus bombers which could reduce the warning to 30 - 90 minutes, some new methods of defense should be instituted in order that naval ships and bases could better withstand a surprise nuclear attack.

Various alternatives which could be adopted to improve this defense posture are examined qualitatively. Some of the alternatives are staggered in-port periods, equal distribution of ships in home ports, even distribution of home ports, hardening bases, keeping ships at sea more, and having an all-submersible fleet.

It is recommended that at least the measure of staggered in-port periods be adopted, and that serious consideration be given to equal distribution of ships in home ports. For ships at sea, the dispersed disposition remains the best choice for the immediate future. Dispersal and hardening of bases and facilities (including control centers) should be accomplished as time and funds permit.

The ideas expressed in this thesis are intended to lead to future detailed and quantitative study of the alternatives, resulting in concrete recommendations for increasing the chances of survival of U.S. Navy ships and bases.

PREFACE

In 1954-55 the author was commanding officer of a small coastal minesweeper based at Charleston, South Carolina. During this assignment, it was observed that at all times there was a great concentration of minecraft in the Charleston area; approximately 45 minesweepers were either engaged in exercises just offshore, moored at the base for upkeep, or berthed at the naval shipyard for overhaul. From this experience, an idea was formulated: an idea of how best to perform the Mine Force's task of keeping harbors, entrance channels and coastal waters free from enemy mining activity. It seemed to the author that, despite the advantages in administration, operation and maintenance to be gained by having the Mine Force, U.S. Atlantic Fleet homeported almost entirely[1] at Charleston, operational readiness, and dispersion against nuclear attack as well, would be improved significantly by stationing mine force ships in smaller numbers at several different major ports along the Atlantic seaboard. The reason for this was two-fold: (1) These ports would require immediate and intensive minesweeping should a conventional war commence with an enemy, and (2) stationing units in several different locations would provide naval personnel with the necessary familiarity with different harbors and channels in order to carry out this minesweeping effectively.

Since that time, the idea of dispersion of ships has gained much

[1]One division of approximately six coastal minesweepers (MSC) was based at Panama City, Florida, to provide services to the U.S. Naval Mine Defense Laboratory; another division of MSC was based at Yorktown, Virginia, at that time the site of the Navy's Mine Warfare School, to provide services there.

momentum, but primarily for the reason of safety against nuclear attack. Not only are naval formations at sea dispersed (as compared to the close circular formations for protection against air attack in World War II), but provision is made for greater safety of ships in port as well. Shore activities, industrial and other civilian types as well as military, are dispersed insofar as possible for the reason of protection against nuclear attack.

The threat of nuclear attack was first represented by an enemy's long range bombers and, in recent years, by the intercontinental ballistic missile. But most Navy ships are still homeported at the traditional ports of Newport, Rhode Island; Norfolk, Virginia; Charleston, South Carolina; San Diego and Long Beach, California; and Pearl Harbor, Hawaii. While there is some dispersion in these ports, there is in each one a concentration of many, many ships whose retaliatory potential could be eliminated by a single 100 megaton weapon in the event of a surprise nuclear attack. For instance, Norfolk alone has 212 Navy ships based there, not including yard craft (tug boats, crash boats, etc.) or ships of the reserve fleet.

In the event of an attack, the dispersion of these ships is now provided for in fleet instructions; but it should be noted that the ability to achieve dispersion is premised on receiving some warning of the attack, in order that the ships have time to get underway and escape from the port being attacked. Even ships with steam up and ready for sea would require about one-half hour to leave the port; and other ships with cold engineering plants would require from one to four hours to depart, depending on the ship type. In the era of the ICBM, where the warning could be as little as 15 minutes, these time requirements are

unacceptable if any fleet units are to remain to prosecute retaliation against the enemy.

This thesis concerns the entire spectrum of defense measures that are being or conceivably could be taken to improve defense of ships and bases. The problem is a long-range one (unless a nuclear exchange occurs tomorrow) and many questions raised herein may themselves be developed as major or joint theses in the future as more information and time becomes available. At this point it should be made clear to the reader that many of the ideas and proposals contained herein are solely those of the author's and do not necessarily reflect official Naval policy.

Appreciation is extended to Professor Thomas E. Oberbeck, Chairman of the Department of Operations Research, U.S. Naval Postgraduate School for his keen interest in the problem and his assistance in bringing all avenues of thought to attention. Mr. R.A. Sulit of the U.S. Naval Radiological Defense Laboratory assisted in verification of the data concerning nuclear explosions. Many thanks go to Lieutenant T.F. Howley, USN, Operations Officer, and to other wardroom officers of the USS SOMERS (DD-947) for their interest, suggestions, and constructive criticism during my brief visit on board. The helpful comments and professional advice of Commander G.M. McGee, USN, Curricular Officer for Navy Management and Cperations Analysis Programs, U.S. Naval Postgraduate School, are very much appreciated. And much praise to my wife, Virginia, who encouraged, assisted, and suffered throughout the preparation of this manuscript.

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CHAPTER I

INTRODUCTION

"There will be no time for preparation after war begins."
---- A. T. Mahan, 1896

BACKGROUND

The basic mission of the United States Navy is control of the seas. In order to accomplish this mission, the Navy employs ships, aircraft and submarines as combat units on, over and under the world's oceans (The Operating Forces); and on land areas owned or controlled by the United States, the Navy has bases and other shore facilities (The Shore Establishment) to support the operations of the fleet. "The Navy Department and the Shore Establishment exis for the purpose of supporting the Operating Forces." /3/

Traditionally, the Navy has accomplished its mission by the direct use or threat of direct use of the firepower of its warships against the ships, naval and merchant, of any nation seeking to deny to our nation, or to our allied, use of the sea lanes. In the years of our Navy's infancy, in order for a naval engagement to take place it was necessary for the combatant vessels to be nearly touching one another, and indeed, many victories were won only when the crew of one ship had actually boarded the other ship and defeated its crew in hand-to-hand fighting. Also, in that era the ordinary citizen ashore heard little about naval warfare and consequently was not much concerned with it.

In the early twentieth century, however, as guns with longer ranges and more accuracy were developed, naval battles were joined at increasingly greater distances until the combatants were nearly out of sight over the horizon from one another. In addition, the destruction

occurring in a naval battle increased due to the use of larger ships (which were required to serve as platforms for the larger guns) and the commitment of many more men required to man such ships. The concept of naval warfare was changing.

The advent of the airplane with its capability of carrying the naval battle to an enemy hundreds of miles over the horizon radically altered the traditional picture of naval warfare. While during World War II the naval air arms of both sides were utilized chiefly on such long range attacks against the enemy's ships at sea, they were also employed in assaults against his bases and ships in port. The air attack on Pearl Harbor by the Japanese must qualify as a foremost example of this latter type of naval battle, although, as M. Ito expresses it in his book, The End of the Imperial Japanese Navy /13/, "It was not really a battle, because the United States had no opportunity to respond in force .... In its consequences, however, it was an event without precedent."

The principal strategic element of the attack on Pearl Harbor was extremely practical: surprise combined with excellent timing. Thus the attack was scheduled for that morning of the week when the greatest number of ships would be in port ---- Sunday. In this way the largest amount of damage could be inflicted with the least cost in planes, bombs, fuel and men. Instead of trying to achieve hits on rapidly maneuvering single targets such as would be the case in attack at sea, the torpedo and bombing planes had groups of stationary targets on which to take aim, and therefore the effects of any one weapon were often compounded. (Indeed we have the record of a torpedo passing under the minelayer OGLALA and exploding against the hull of the cruiser HELENA,

resulting in the eventual capsizing of the OGLALA; and who can say whether more damage was done to the DOWNES by the CASSIN rolling over on her in drydock or by the incendiary bomb that exploded between them?)

And now in recent years there has appeared the intercontinental ballistic missile (ICBM), able to span nearly half the globe in half an hour, allowing little warning to defenders, and carrying in its warhead destructive power so fantastic that it is incomprehensible to the minds of most men. No longer can the bogies appearing on the radar scope at 100 miles give the task force or area commander time to prepare his defenses and counterattack; no longer can a ship in port on "one hour steaming notice" consider herself safe. No longer is a miss as good as a mile, for the hell unleashed by one nuclear warhead of 100 megatons (MT) detonated at optimum air burst height, for example, causes very severe damage to everything not underground or under water out to a radius of 30 miles from ground zero. /11/ And no longer is the ordinary citizen oblivious to the fact of naval warfare for in many instances he is part of the target also.

So the problem of defense in the 1960 era is one of achieving total preparedness. Perhaps, too, it is the same problem in the period after 1970 so long as Communism and its way of life confronts the way of life in the United States and the free world. World War III is not inevitable, but we must be prepared for it; and since a situation where the free world nations would commence the hostilities is most unlikely, then our naval defenses must be such as to withstand the initial onslaught, be able to retaliate, and help defeat the enemy.

OBJECTIVE

Herein lies our problem: The ships, aircraft, bases and men of our Navy must be in the optimum defense posture NOW; for if the enemy "pushes the button" in the next minute (or day or month or decade), destruction will arrive about 30 minutes later. Therefore it is the objective of this thesis to explore ways of improving defense of the U.S. Navy against surprise nuclear attack by examining all possibilities of accomplishing the following:

1. Protection of ships in order that they may participate in any necessary follow-up action against the enemy.
2. Protection of bases in order that they may support the fleet as soon and as much as possible after the attack has occurred.
3. Protection of control centers in order that the fleet's efforts will be coordinated toward the one goal: defeat the enemy.

ASSUMPTIONS

There are four basic assumptions made in the presentation of this thesis:

1. The nuclear attack is a complete surprise to the defenders.
2. The attack is initiated by the launching of ICBM's against the United States and/or its forces; this attack is followed by attack with manned bombers and/or submarine-launched missiles.
3. The types of ships to be defended are those of the size of a coastal minesweeper (MSC) and larger; i.e., those ships with displacement over 300 tons.

4. The types of bases to be defended are those which contribute directly to fleet support; i.e., naval bases, stations, shipyards, naval air stations, communication stations and naval supply depots (continental United States and foreign).

ALTERNATIVES

When one applies his thought processes to the realm of alternatives, he eventually discovers that he is contemplating a very broad spectrum of choices, ranging all the way from doing nothing to doing everything possible (and sometimes even the "impossible"!), with the most likely choice being somewhere in between.

So it is here. When one looks at the overall problem, he realizes that he should begin with a condition of complete disarmament and proceed to the other end of the scale where he finds that military installations and ships are fully manned around the clock, the fixed installations are completely hardened and otherwise protected from all effects of nuclear bursts, and the mobile installations, ships and aircraft are always moving and ready to commence firing on seconds' notice. Of course, as things stand today, these extremes are very unlikely; it is doubtful if total disarmament will ever be achieved, and if war should come, it is likely to occur prior to the arrival of that state of affairs where each gunman has his pistol out, aimed, and his finger on the trigger.

Therefore, in the following chapters discussion will concentrate on the middle ground areas, attempting to hit upon that idea or combination of ideas which will yield "maximum return at least cost".

METHOD OF APPROACH

The approach to this problem is a qualitative rather than a quantitative one. Each possible concept of defense receives some attention, with examination in some detail of those ideas which seem most promising. In Chapter II the concept of disarmament with its attendant difficulties is briefly discussed.

In Chapter III various alternatives are considered which are aimed at providing improved defense for ships in port. (Since the most likely time for an enemy to make a surprise nuclear attack is when a majority of Navy ships are in port, the emphasis is placed on examination of defense in this situation.) The alternatives considered include (1) no change, (2) staggering in-port periods (and consequently operating periods), (3) assigning ships in more equal numbers into home ports now used by the Navy, and (4) creating new home ports and bases which are separated by at least 100 miles. Also discussed is the possibility of keeping ships at sea for greater periods of time by utilization of a two-crew system. Appendices A, B and C present specific examples of results which may be expected under the alternative of creating additional home ports.

One possible alternative for defense of ships at sea is discussed in Chapter IV: the gradual implementation of a submerged fleet[2].

A discussion of the defense of bases and control centers is presented in Chapter V; emphasis of the discussion is placed on alternatives

[2]As used in this thesis, the term "submerged fleet" (or its equivalent) will mean a fleet consisting of ships which carry out all the present missions and tasks of the ships of the U.S. Navy, such as aircraft carriers, amphibious ships, service force ships, minesweepers, etc.; but which ships also have the capability of submerging beneath the ocean surface for the purpose of avoiding electronic or visual detection.

which are more likely to receive serious attention by the U.S. Navy. Three alternatives appear in this chapter ---- dispersal of bases and facilities, mobility, and hardening of bases to provide protection of these important fleet support facilities.

Chapter VI is a summary of what has gone before. It indicates that something should be done in each area of defense in order to reduce the concentrations of ships and shore installations that now exist. For ships in port, staggered in-port periods is viewed as an immediate measure that can be employed, while dispersal of ships, bases and facilities into other locales will take time and money.

In view of the scope of this thesis and the number of ideas presented, it is intended that it will serve as the general guideline for major, joint thesis efforts by students in the Operations Analysis Curriculum at the Naval Postgraduate School in subsequent years. It is anticipated that the ideas considered herein will stimulate further exploration into specific areas, resulting, hopefully, in concrete recommendations which, if carried out by the Department of Defense, will increase the chances of survival of Navy ships and shore installations considerably. Appendix D furnishes a list of suggested thesis topics derived from this study.

CHAPTER II

DISARMAMENT

GENERAL

Disarmament is defined by Webster as "the reduction of a military establishment to a minimum set by some authority". Since reduction or elimination of certain military installations is a distinct possibility at this time, let us consider the effect of such disarmament on the present naval defense posture. There are two alternatives we may study briefly in this regard --- complete disarmament and partial disarmament.

ALTERNATIVE 1 - COMPLETE DISARMAMENT

If complete, total disarmament were ever achieved, there of course would remain no problem for this thesis to consider. The situation of total disarmament is the zero end of the scale, for where there is nothing to defend against, no defense is required. However, we can say that total disarmament may not solve the problem of nuclear war (or any type of war) because

1. There may be the suspicion on either side that the other side did not totally disarm, but in fact secreted some weapons for future aggression or defense, and
2. The knowledge of, and industrial capability for, producing weapons will still exist.

ALTERNATIVE 2 - PARTIAL DISARMAMENT

And similarly for the case of partial disarmament. Let us propose for example, that all nations possessing them agreed to destroy all existing nuclear warheads and to manufacture no more; and this agree-

ment was carried out by these nations. Does our problem then remain?

The answer is yes, for the following reasons:

1. Agreements may be broken. Certainly the Soviet record in this regard has been noteworthy[3]. Even if no nuclear weapons existed for a century or more after the execution of an agreement, the knowledge and ability to manufacture them would yet exist as we have said. Generations yet unborn might recall resentments their forefathers held, and if provoked sufficiently, would cast aside the "ancient agreements".
2. The nations would still have their conventional forces to protect against a surprise attack. The Pearl Harbor disaster occurred in the age of radar and good communications; is it not reasonable to expect that a similar affair could occur in this age of more advanced methods of detection and communications, even without the use of missiles and nuclear weapons? Certainly the military powers would examine in their war games the possibilities of such surprise attacks with conventional weapons.

In addition to those problems listed above, there are others caused by disarmament, whether it is partial or total.

First, there is the problem of finding other employment for the many thousands of men and women who now man military installations around the globe. These people are, in the main, hard-working dedicated citizens who have much to offer in all fields of business, industry, public service, etc.

Secondly, there is the problem of economy, or even of survival which will plague those communities which depend on an adjacent military

[3]U.S. Congress. Senate. Committee on the Judiciary. Soviet Political Agreements and Results. U.S. Government Printing Office, Washington, 1959: v-xi.

post for much of their livelihood.

Another problem is the disposal of weapons, ships, planes, bases, etc. Whereas many items (e.g., communications equipment, transport planes, steam turbines) will be salvageable for civilian uses, most will not and will have to be sold for scrap.

As to cost of disarmament, one might be easily tempted to say at first that disarmament will save money. Indeed, when one compares the cost of the world's annual military expenditure today with what it was in 1930 (100 billion dollars today as opposed to four billion dollars then)[4], he will surely exclaim, "Think of the money we'll save!"

But has this man <u>really</u> counted the cost? The paper of Topchiev stimulated a reply by Morton A. Kaplan in which he makes an impassioned plea for opposition to "disarmament merely for the sake of disarming." He says that we should, of course, examine carefully the merits of every plan for disarmament or arms control; but we should not let the natural desire for peace lead the United States to steps that threaten our national security but do not diminish the danger of war. In essence, Kaplan says that a balance of arms, particularly hardened nuclear missile bases, or mobile ones, is more likely to reduce the mutual danger of surprise attack than to increase it.[5]

Advantages of disarmament, then, appear to be chiefly found in the reduced or eliminated costs of weapons, weapons carriers, and the small

[4]A.V. Topchiev, "Disarmament and International Tension", <u>Bulletin of the Atomic Scientists</u>, xiv (December, 1958), 405-408. Reproduced in /8/.

[5]M.A. Kaplan, "The Fantasy of Disarmament". <u>New Leader</u>, xlii (March 2, 1959), 6-8. Reproduced in /8/.

possibility that a true state of peace could be achieved thereby.

Disadvantages are found in the facts that any disarmament treaty agreed upon by the major powers of the world today must rest its validity upon the honesty of all governments involved, and that at least one of those governments has demonstrated numerous times in the past its failure to be honest with the rest of the world. And unless, as Kaplan says, we kill all physical scientists, the knowledge necessary to produce nuclear weapons is our inescapable heritage.[6] Any amount of disarmament is going to weaken or lessen our defenses; and unless our defenses are reduced at a lesser rate than those of the potential enemy, we may wake some morning to discover that he has an advantage over us and intends to use it either to intimidate us into submission or even to eradicate us.

A thesis in this area could study in detail the effect of partial disarmament on the present naval defense posture.

[6]Kaplan, op. cit.

CHAPTER III

DEFENSE OF SHIPS IN PORT

GENERAL

Current fleet instructions prescribe conditions of readiness for ships in port[7]; the setting of any one particular condition is principally dependent on intelligence estimates of the potential enemy's capabilities and intentions for the immediate future. Generally speaking, our present cold war strategy calls for a condition of war readiness only as an exercise measure or when national crises occur (such as the missile crisis in Cuba in late 1962). Since crises often come about through a gradual escalation of events, there is some warning available such that the element of surprise would be lacking if the crisis were to culminate in a nuclear attack upon the United States or other free world nation. Therefore, we must devote our attention to the instructions for defense of ships that would apply in the event of attack by an enemy resulting in complete surprise.

For naval ships in port, present instructions call for an emergency sortie from all ports, with escort vessels preceding capital ships in order to protect the latter against possible attack by waiting submarines. Even should all ships be so fortunate as to be able to get underway within a few minutes after the broadcast of the warning, it is doubtful that very many of them would be clear of the harbor before the enemy missiles arrived at the target. If, however, the enemy plan is to

[7]References /7/, /9/, and /16/ for various elements of the U.S. Pacific Fleet are representative of these instructions.

utilize his ICBM's in an attempt to knock out our ICBM retaliatory power first, and use his bombers and/or submarine-launched missiles against our ships and port cities, then additional time (perhaps up to one hour) would be afforded the ships for escape. Notice, however, that in the most optimistic situation a maximum of 90 minutes warning is given (based on 30 minutes missile flight time); most ships in port, with only enough steam for auxiliary power, require this much time just to get underway, let alone proceed clear of the port. Ships powered by diesel engines, such as minesweepers and conventional submarines, are able to get underway in about 15 minutes time; but it is conceivable that, if sortieing in large numbers, they could obstruct the departure of large, faster ships which did have steam up and were ready for sea at the time of the warning.

Thus it seems that the current strategy of emergency sortie is insufficient in this era of the ICBM and Mach 2-plus bombers. Something should be done; what are the possible alternatives?

ALTERNATIVE 3 - NO CHANGE

First let us consider leaving things as they are. That is, let us not disarm, but neither let us continue in an arms race.

Choosing such an alternative as this would likely signal an end to research on and development of ideas --- ideas which might help prevent nuclear holocaust.

To the Navy, choosing this alternative would mean that present numbers of ships, aircraft and bases would be held more or less constant, and the cost involved would be relatively low (maintenance and repair, and replacement of worn-out items). The advantage <u>is</u> the small

cost, but the disadvantages are numerous; in considering our specific problem in this chapter of defense of naval ships in port, the following disadvantages of non-improvement come to mind:

1. There would remain unacceptable concentrations of ships in certain ports.
2. There would be no improvement in emergency sortie plans; i.e., improvement designed to evacuate a port more rapidly than presently is the case.
3. The vulnerability of our ships to surprise attack would increase as weapon yield and missile accuracy were improved by the potential enemy.
4. Morale of naval personnel would deteriorate as they became aware of the decreasing defense posture indicated in 1 - 3 above.

In order to overcome these disadvantages, there are measures that could be adopted by the Navy in the immediate future and in the somewhat distant future. Let us consider five alternatives in this regard, commencing with those which appear easiest and quickest to place in effect.

ALTERNATIVE 4 - STAGGERED IN-PORT PERIODS

In consonance with present U.S. Navy policy, nearly all ships of the Operating Forces which are not on extended deployments are in a port on weekends, and this port is normally the home port of each ship. During the week, approximately half of the ships exercise at sea while the other half remain in port for upkeep, overhaul, in-port training, etc., since current fleet regulations specify six weeks of operations at sea during any one quarter.[8] Therefore it is not difficult to conclude that

[8]U.S. Pacific Fleet Regulations 1963: Article 3202.21. CINCPACFLT INST P5440.3A

a surprise attack, if one were attempted, would be made on a Saturday, Sunday, or holiday when there would be the greatest concentrations of ships immobilized in port.[9]

As a measure which could alleviate this condition of concentration in a relatively short period of time and with little difficulty or hardship to personnel involved, the author proposes the alternative of staggered in-port periods. In essence, adoption of this plan would mean that some ships would be scheduled to be in port for "midweeks" on weekdays such as Wednesday and Thursday, and to be operating at sea on Saturday and Sunday; while other ships would be scheduled in the way now normal. In addition, in order to permit equitable time in port on actual weekends for all ships, the ships would rotate being on the staggered schedule at appropriate intervals. A sample schedule of in-port and operating days under this plan is shown in Table 1 for ships which usually operate at sea for five days or more at a time. A similar schedule is shown in Table 2 for those ships which usually operate on a daily basis, but are capable of remaining at sea for at least three days without replenishment.

Table 3 illustrates the effectiveness of this staggering plan by comparing the percentages of ships in port each day during a typical week under the present plan and under the new plan.

The principal advantage of this alternative of staggering in-port periods is, then, the reduction of numbers of ships in port on Saturday and Sundays, such that no port presents an attractive target for nuclear

[9]"Immobilized" only in that at the time of enemy missile launch the ships would not be underway, and that although as much as 90 minutes would elaspe until arrival of the bombers, some ships would not yet have been able to get underway.

TABLE 1

Sample Schedule for Ships With Five Days or More Endurance

		Squadron 1		Squadron 2	
Week	Day	Division 1	Division 2	Division 1	Division 2
1	Mon	O	U	O	U
	Tue	O/I	U	O	U
	Wed	I	U	O	U
	Thu	I	U	O	U
	Fri	O	U	O/I	U
	Sat	O	U	I	U
	Sun	O	U	I	U
2	Mon	O	U	O	U
	Tue	O/I	U	O	U
	Wed	U	U	O	U
	Thu	U	U	O	U
	Fri	U	O	O/I	U
	Sat	U	O	U	U
	Sun	U	O	U	U
3	Mon	U	O	U	O
	Tue	U	O/I	U	O
	Wed	U	I	U	O
	Thu	U	I	U	O
	Fri	U	O	U	O/I
	Sat	U	O	U	I
	Sun	U	O	U	I
4	Mon	U	O	U	O
	Tue	U	O/I	U	O
	Wed	U	U	U	O
	Thu	U	U	U	O
	Fri	O	U	U	O/I
	Sat	O	U	U	U
	Sun	O	U	U	U

Symbols - O: Operating both day and night

I: In port both day and night

O/I: Operating day, in port at night

U: Upkeep

TABLE 2

Sample Schedule for Ships With Endurance At Least Three Days

		Squadron 1		Squadron 2	
Week	Day	Division 1	Division 2	Division 1	Division 2
1	Mon	O	U	I	U
	Tue	O	U	O/I	U
	Wed	O/I	U	O	U
	Thu	O	U	O/I	U
	Fri	O/I	U	O	U
	Sat	O	U	I	U
	Sun	O	U	I	U
2	Mon	I	U	O	U
	Tue	O/I	U	O	U
	Wed	O	U	O/I	U
	Thu	O/I	U	O	U
	Fri	O	U	O/I	U
	Sat	I	U	O	U
	Sun	I	U	O	U
3	Mon	U	I	U	O
	Tue	U	O/I	U	O
	Wed	U	O	U	O/I
	Thu	U	O/I	U	O
	Fri	U	O	U	O/I
	Sat	U	I	U	O
	Sun	U	I	U	O
4	Mon	U	O	U	I
	Tue	U	O	U	O/I
	Wed	U	O/I	U	O
	Thu	U	O	U	O/I
	Fri	U	O/I	U	O
	Sat	U	O	U	I
	Sun	U	O	U	I

Symbols: O - Operating both day and night

I - In port both day and night

O/I - Operating day, in port at night

U - Upkeep

TABLE 3

Comparison of Percentages of Ships in Port under Present Operating Policy and under Alternative 4

Day	Present Plan	%	Staggered Plan	%	Percent Change
Mon	44	50	44	50	0
Tue	43	49	65	74	+25
Wed	46	52	65	74	+22
Thu	51	58	65	74	+16
Fri	82	93	65	74	-19
Sat	85	97	66	75	-22
Sun	85	97	66	75	-22

Port used in example: Long Beach/San Pedro, California

Number of ships homeported in Long Beach/San Pedro: 116

Less number of ships deployed:..... -28

Maximum number of ships in port:..... 88

attack on any one particular day of the week. One of the secondary advantages is that this plan involves the least change in present operating policy and plans. The method of scheduling indicated by Tables 1 and 2 could be placed into effect in the next quarterly operating schedule, or by a change to the present quarter's schedule if immediate implementation was desired.

This alternative also provides its measure of protection at little cost. There is no cost increase as regards operation of the vessels, but there would probably be some additional costs in operating the shore facilities. The increased cost results from the fact that additional naval and civilian personnel may be required at certain times to provide normal services to those ships which enter port for a "weekend" in midweek. But it is anticipated that this cost would be very small since those ships would not be having normal working hours during that in-port time.

A further advantage is evident in the fact that there is more uniform utilization of the offshore operating areas in which the ships conduct their training. Instead of having crowded areas five days of the week and practically nothing taking place during the other two, there would be a more or less equal number of ships exercising every day. (One caution in this regard: Avoid the temptation to demand too much of ships and aircraft which provide services.)

At its inception, this alternative would very likely be deleterious to morale, and probably would be so for some time thereafter. But once personnel are used to it, it is doubtful that they would still complain very strongly.

Other problems may arise in the area of public opinion; either from

the standpoint of "They're working my boy too much" and "He's made to work on Sundays now", or from the additional sea operations on weekends which would be objectionable to boating enthusiasts.

Another disadvantage is that most of the time there is 75% concentration of ships in port. To remedy this situation we must look at the next alternative.

ALTERNATIVE 5 - EQUAL DISTRIBUTION OF SHIPS IN HOME PORTS

As stated earlier, there are several ports in the United States which are home ports for the great majority of the Navy's ships. In addition to these ports, the Navy has both large and small shore installations at certain other ports, including overseas bases; but relatively few naval vessels are based permanently at these latter locations. Under this alternative it is proposed that these additional ports, both U.S. and foreign, be used more extensively as bases by ships of the active fleets; that is, ships would be distributed approximately equally among all the above-mentioned ports, with care being taken to avoid spreading small forces which work as a group (such as amphibious squadrons) too thinly. Table 4 lists the ports presently in use with the approximate number of active ships homeported in each, and a list of additional ports which might be used for the equal distribution proposed.

The principal advantage to be gained from such a distribution is dispersion of ships and personnel against attack. In other words, one nuclear warhead dropped on any one location will have less devastating effect on the Navy as a whole; or, it will take many more bombs or missiles to achieve a result comparable to that which might be achieved on a weekend night at present. Of course, missiles can be programmed for any location, but scattering of targets reduces probability of destruction.

> Example: Assume a certain nuclear weapon launched against a base has a .70 probability of achieving total destruction of that base. Assume next that there are five smaller bases to be attacked, and the probability of total destruction of each of these bases is .85. But now the probability of total destruction of all five bases is $(.85)^5 = .444$. Thus the probability of destruction of all facilities has been reduced by .256 by the dispersion.

TABLE 4

Comparison of Concentrations in Home Ports of Active Naval Ships[10]

Present Major Home Ports	Number of Ships	Present Home Ports which could be expanded	Number of Ships
Newport, R.I.	59	Boston, Mass.	9
New London, Conn.	38	New York, N.Y.	10
Norfolk, Va.	212	Philadelphia, Pa.[11]	8
Charleston, S.C.	88	Panama City, Fla.	5
Mayport, Fla.	36	Pensacola, Fla.	2
Key West, Fla.	25	San Juan, P.R.	1
San Diego, Calif.	168	Seattle, Wash.[11]	3
Long Beach, Calif.	116	Guam, M.I.	4
San Francisco, Calif.	36	(Also the following if bases on foreign soil are considered)	
Pearl Harbor, Hawaii	80		
	858		
		Rota, Spain	1
Other Home Ports	81	Naples, Italy	3
		Subic Bay, Philippine Is.	3
		Sasebo, Japan	11
		Yokosuka, Japan	22
Total Number of Ships:	1021		82

[10]SSBN's not included.

[11]Philadelphia and Seattle, at 88 and 125 miles, respectively, from the open ocean, may be considered as too remote to be good home ports.

Another important advantage would be the increase in morale of personnel. With the ships distributed evenly among the major U.S. ports, it would be possible for all ships to have their overhauls assigned to their "home yard" (naval shipyard) or to a nearby private shipyard. During the recent deliberations by the Department of Defense concerning the naval shipyards, Rep. Hosmer of California argued for retention of those shipyards under the axe, stating that return of ships to their home yards for repair could save the government money (through improved morale). He said:

> If sending the ships to a Navy yard where the men can be reunited with their families on return from long overseas duty --- instead of to some other shipyard away from home --- encouraged only 63 more men to reenlist, the saving on ship costs would be entirely wiped out (balanced) by savings on personnel costs.[12]

Rep. Hosmer hased his estimate above on the fact that it costs approximately $7,000 to train and equip a replacement for a seagoing Navy man who fails to reenlist, and on the reported facts of an independent survey which showed that work on 247 repair jobs over a three-year period would be $437,700 cheaper in private shipyards.

The author feels that this is very true. One of the services' greatest problems is keeping trained personnel and getting career officers. For example, what could more discourage an airman or an officer with a family, who is assigned to a San Diego based aircraft carrier, than to learn that upon return from a six-month cruise in WESTPAC that his ship will be sent to Puget Sound for its four-month overhaul? Granted that the ship will have a month of leave and upkeep in San Diego before

[12]Associated Press dispatch, Monterey [California] Peninsula Herald, March 18, 1964.

proceeding to the shipyard, this still means that the ship has only two months out of a year in home port. If the overhaul were in the home port, then the crew (in this example) can be with their families one-half of the year vice one-sixth of it.

There are, of course many disadvantages or problems connected with such a plan of distribution of ships into ports not used much as home ports at present. The first disadvantage would be the cost of moving personnel and their household effects to the new port, and in the case of moving to overseas bases, this cost could be extremely high. Later it would probably be necessary to increase or relocate shore facilities in order to properly support the increased number of ships in the new home ports, and there would very likely be costs involved in the reduction of facilities in those home ports where the number of ships now assigned was drastically reduced. As a further study in this particular area, a thesis could consider the cost-effectiveness of such a move on West Coast and Pacific ports, for example.

An additional problem appears when we take into consideration home-porting ships at our bases on foreign soil. This problem is the necessity of negotiating with the host country for permission to increase our forces stationed there. Though time and effort on the part of many persons will have to take place in order to accomplish this, this particular problem is seen as a lesser disadvantage than those mentioned above.

As in the alternative of staggered in-port periods, here also is the problem of changing operating schedules, but more so because transit time from the new ports to present operating areas must be taken into account. From some locations (such as Seattle) the distance to these areas is manifestly excessive so that new, more convenient areas would

have to be established for ships based at these ports. This is discussed in more detail under Alternative 6.

ALTERNATIVE 6 - EVEN DISTRIBUTION OF HOME PORTS

Although improved dispersion of the fleets would result if the ships of the Navy were stationed in more or less equal numbers in the 23 principal ports listed in Table 4, still a concentration of ships of the order of 40 to 45 would exist in each port. Should it become necessary to achieve yet more dispersion, the alternative of even distribution of ports is proposed. This alternative involves not only using locations presently serving as home ports for ships of the Navy, but also involves establishing home ports in locations not now so employed. Such establishment may involve everything from merely securing facilities for Navy use in an already existing commercial port (e.g., Astoria, Oregon) to creating an entirely new port, including blasting out a man-made harbor where required.

The purpose of such a plan is essentially to disperse the fleet (when in port) to that thinnest distribution possible without complicating the operations, administration, and logistics of individual ships to an unacceptable degree. This plan then provides the dispersion obtained when certain degrees of present dispersal plans[13] are placed into effect, but with zero time delay.

The primary problem associated with this alternative is a problem

[13]See Reference /9/.

of location:

1. Where do we want new ports?
2. Where can we get new ports?
3. What is the optimum separation of these ports?

The first of these questions can best be answered by investigating all ports, and evaluating them against the following conditions of strategic value which are the same today as they were when Mahan wrote them down in 1911:

1. The position (of a place), or more exactly its situation. A place may have great strength, but be so situated with regard to the strategic lines as not to be worth occupying.
2. Its military strength, offensive and defensive. A place may be well situated and have large resources and yet possess little strategic value, because weak. It may, on the other hand, while not naturally strong, be given artificial strength for defense.
3. The resources, of the place itself and of the surrounding country..... /1/.

The second question can only be resolved through understanding agreements made by officials of federal, state and local governments. Assuming the construction appropriations needed have been voted by Congress, the actual physical takeover of the required land and available facilities must be accomplished through legal and proper channels. This is so not only for the purpose of doing justice to the present owners, whether state, community, or private, but also for the extremely important purpose of making the Navy's presence desirable to the local community. Many a military installation has been unwelcome and disliked in the past by civilians merely because of the manner in which the govern-

ment moved in and took over community and private property.

As to the third question, several factors must be considered. Maximum separation of ports is limited by the factors of (1) keeping down costs of transportation of materials and personnel, and (2) reducing the distance ships must travel to operating areas and to larger bases or shipyards for major repairs. Since 250 miles is a distance most ships can conveniently cover in an overnight voyage, it is suggested that the distance between ports be no greater than this. Minimum separation is limited by the destructive ranges and CEP's[14] of bombs and missiles which may be used against the port. Since a 100 megaton weapon has a severe blast damage range out to about 30 miles,[15] the ports should be no closer together than twice that distance, or 60 miles apart, so that one weapon can damage or destroy only one port.

Considering these maximum and minimum distances, a mean distance of 100 miles separation for the ports is proposed. Fig. 1 shows 20 recommended locations for these ports on the Atlantic and Gulf coasts; Fig. 2 shows 12 locations on the Pacific Coast.[16] These locations were chosen primarily in accordance with the third criterion above, that of optimum separation. A follow-on thesis which would thoroughly investigate the suitability of these ports is envisioned. Such a thesis would study in detail the following items (and possibly many others):

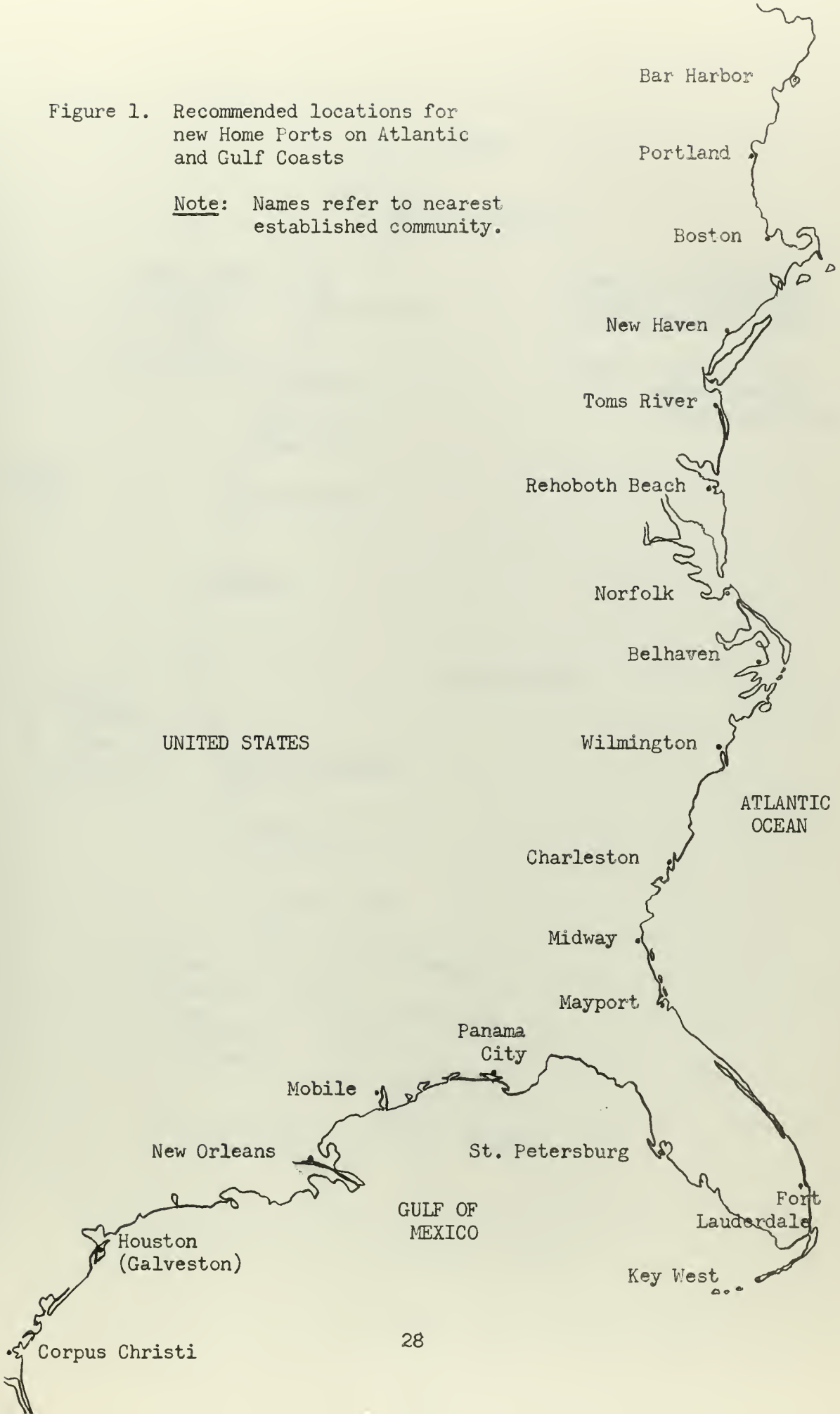
[14]Circular Error Probable.

[15]See Reference /11/, pages 96 and 151.

[16]Together with the eight overseas ports listed in Table 4, these locations make a total of 40 home ports.

Figure 1. Recommended locations for new Home Ports on Atlantic and Gulf Coasts

Note: Names refer to nearest established community.



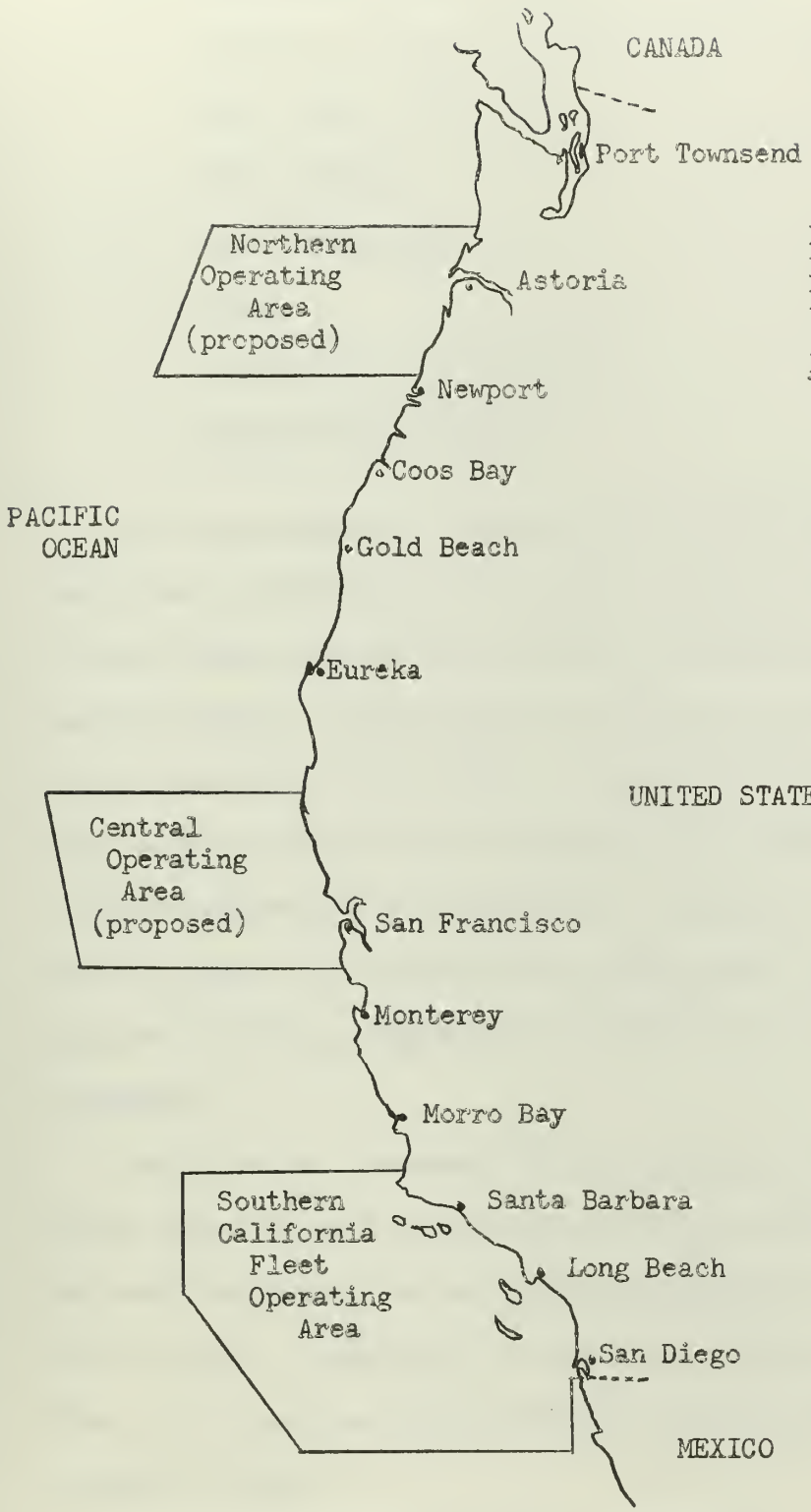


Figure 2. Recommended Locations for New Home Ports on Pacific Coast

Note: Names refer to nearest established community.

1. The strategic value criteria of Mahan.
2. Facilities available (transportation, warehouses, pier space, fuel, water, power, etc.).
3. Public opinion.
4. Legal requirements.
5. Morale.
6. Availability of contractors.
7. Appropriations required.

The next problem in conjunction with this alternative is that of its effect on operations of the fleet. This is a very complicated facet of this thesis, and in order to give it suitable treatment, the field is narrowed down to a single type of naval ship, the destroyer, and to a single ocean area, the Pacific. A comparison, then, of operations of these ships in their present situation and in the situation as it would be under Alternative 6 is presented in Appendix A. In short, this appendix compares and contrasts the organization, bases, deployments, operations, training, logistics and maintenance of these ships in the two situations.

The principal advantage of this alternative over Alternative 5 (where ships are only distributed into those ports where the Navy already has some facilities) is the increased dispersal of ships at all times when in port. In addition, the following advantages accrue; some of them, it is true, are also advantages of Alternative 5, but are here increased in value.

The first of these secondary advantages is the reduction in time late of surface units to an unidentified submarine contact datum.[17]

[17]Datum is the last known location of a submarine contact.

In the present situation, if destroyers are ordered from Long Beach to proceed to sea and attempt to pick up the trail of and verify such contacts, the time late at datum may be very great if the original contact was some distance away. For example, if the original contact was 100 miles west of San Francisco, 16 hours steaming at 25 knots[18] would be required; if it was 100 miles off the mouth of the Columbia River, 38 hours at 25 knots is the requirement.[18] By contrast, if the destroyers were dispersed into the ports indicated in Fig. 2, and the upkeep periods of ASW ships was so scheduled that ships in no two adjacent ports had upkeep at the same time, it is seen that the time late may be reduced to not more than four hours for either case, once the ships are underway. Present doctrine states that if time late at datum will be more than four hours, the contact will not usually be pursued. (This particular readiness posture in ASW could even be the greatest advantage of this alternative if the enemy's strategy should change to that of having first strike by submarine-launched missile rather than by ICBM.)

Another advantage is the increased familiarity with various ports of the United States that officers and men alike would be obtaining. This particular advantage is perhaps most significant to personnel of the Mine Force, whose ships would be required to sweep all the various harbors and river entrances to major ports in the event of hostilities. Since accurate navigation is vital to mine-hunting and minesweeping, it would be an invaluable help to the crews of these mine countermeasures ships to be personally cognizant of not only the above water landmarks of a particular location, but also, and perhaps even more importantly,

[18]Computed from Long Beach breakwater entrance.

its underwater contours, bottom materials, currents, and tidal fluctuations.

Familiarity of personnel with the various ports suggests the next advantage of this alternative; increased familiarity with the Navy and its requirements that would obtain to the civilian populace of these new ports. Providing that the Navy's entrance into the community takes place in the considerate manner mentioned earlier in the discussion of this plan, the civilian's interest in naval affairs will start off on a good note. Then, as the citizens of the port observe the Navy personnel at work, not only as defenders of our country, but also as citizens participating in the public affairs of the community, the townspeople will be much more likely to encourage their representatives in government to assist the Navy in obtaining its appropriations and other requirements.

In this alternative, too, is the advantage of having overhauls and other repairs periods such as restricted availabilities not too distant from home port (if not in the home port).

There are also disadvantages connected with this alternative. Undoubtedly the biggest disadvantage is the cost involved: the cost of obtaining land in new ports for facilities, the cost of constructing the facilities, the cost of transferring facilities and personnel from other ports (particularly when transferring to overseas home ports), the increased cost of transportation to fleet schools and other Navy schools, the possible increased cost of overhauls due to awarding more contracts to private shipyards, the increased cost of fuel for some ships due to remoteness from their assigned operating area, and so on. Appendix B furnishes a limited cost analysis of the proposal for Pacific Fleet destroyers contained in Appendix A. Appendix C is a subjective discussion

of what might be done to alleviate the cost of providing housing, commissaries, exchanges, and dispensaries for the dependents of Navy personnel residing in each of the new ports.

Another disadvantage would be the separation of many of the ships from centers (such as naval shipyards) where technical services may be easily obtained. For example, both new and old ships are now receiving a greater number of extremely complex electronic systems than ever before, such as the Naval Tactical Data System and other computerized attack and detection systems. These systems will often require maintenance assistance from outside of the ship, at least for the initial months after the ship has received the equipment.

A possible answer to this problem would be to locate the new ports near a good airfield (or to construct an airfield if need be) so that navy yard or civilian technicians could be flown in to assist ship personnel when necessary. If it should be ascertained that a particular job cannot be accomplished by these men in the field, then the ship's presence at a naval shipyard will be required.

A very significant additional disadvantage of this alternative is the requirement for additional naval personnel on shore duty. While it is true that the reduction of facilities in the present major home ports would provide some personnel to lessen the problem, the plain and simple fact of 23 new home ports, ports which had essentially no Navy ships or installations in the past, dictates a large increase in shore billets. This means that additional personnel would have to be recruited for naval service, and the pay, training, and other support of these new service members add still more costs to those enumerated previously.

A subsequent thesis could consider the cost effectiveness of this alternative by detailed examination of the projected costs (land, construction, transportation, personnel, etc.), evaluating the effect obtained in ship operations and defense, and thereby providing guidance as to whether or not the cost versus effect gained is an acceptable economic ratio.

ALTERNATIVE 7 - HARDENING OF BASES

The next step beyond maximum dispersal of ships in home ports is increasing the survivability of the ships' bases, both old and new, since continued existence of their bases is a major requirement for keeping the ships in operation. This is confirmed by A. E. Sokol in his book, Sea Power in the Nuclear Age./10/ Also, the hardening of the base may well afford some physical protection to the ships berthed there if a direct hit is not achieved.

Since Chapter V is devoted to defense of bases, this subject will be discussed more fully there.

ALTERNATIVE 8 - KEEP SHIPS AT SEA

The ultimate in protection of ships when in port would be to have a quantity of zero ships in port at all times; then no matter what probability an enemy missile or bomb has of hitting its (shore) target, the expected payoff is zero as far as destroying naval ships is concerned.

But such a proposal is manifestly absurd: ships have to have replenishment and maintenance; and while some of this can be done at sea, there still remains the necessity for entering port for the majority of it. And of course, the biggest detriment of all is the personnel situation --- no one would join a Navy that always stayed at sea.

However, the Blue and Gold crew plan of Polaris submarines provides a compromise on this idea; by having two crews a ship could remain out of port for a longer time than at present. Then if the day comes when all Navy ships are nuclear-powered, the problem of fuel replenishment is 95% eliminated /10, pg 174/. Maintenance would still remain as a full-fledged requirement; but it has been demonstrated by the Polaris boats that ships can operate for long periods without in-port maintenance, and certainly during World War II ships had little time alongside piers or at anchor in which to make repairs.

So here, too, is a topic for a subsequent thesis./17/ At first look, some of the advantages are that:

1. There is maximum time at sea and minimum time in port, so that probability of damage or loss in a surprise attack situation is minimized.
2. Ships are more nearly ready for war at all times.
3. Seaports are less lucrative targets.

Some disadvantages are that:

1. The difficulty and cost of obtaining personnel (the number of naval personnel on sea duty would be nearly doubled with perhaps slight decrease in numbers of shore-based personnel) may be prohibitive.
2. It may not be feasible to exchange entire crews on ships as large as carriers and cruisers where thousands of men are involved.
3. Ships may wear out in a shorter time than they would with regular in-port maintenance.
4. Public opinion might well be opposed to such a costly means of providing protection.

CHAPTER IV

DEFENSE OF SHIPS AT SEA

GENERAL

The last proposal of Chapter III, that of keeping ships at sea as much as possible by a two-crew method, leads logically into discussion of what can be done to defend naval ships at sea against surprise nuclear attack.

The principal method in effect today is the randometric formation or disposition which is described in detail in ATP-1 and other naval publications /14/. Its chief advantage is that the ships are so well dispersed that a bomb or missile destroying or damaging one ship would have very little effect, if any, on any other ship in the formation. Undoubtedly the greatest disadvantage or problem connected with this means of defense is the difficulty of maintaining good communications between the scattered ships. This is especially troublesome under electronic silence conditions since the ships are usually out of visual communication range of each other.

ALTERNATIVE 9 - SUBMERGED FLEET[19]

Despite the problem of communications, the randometric formation or disposition remains such an excellent method of protection of ships at sea against nuclear attack, surprise or not, that it is not easy to discover a means of improving on it. Only one new area seems to be indicated ---- that of subsurface fleets. By this is meant the gradual increase of subsurface forces and capabilities, with concomitant

[19]See footnote, page 6.

reduction of surface forces, until the entire United States fleet is subsurface.

The ultimate of this idea would be, of course, "flying submarines", ships capable of traveling in both inner and outer space,[20] and on the surface of the water also. One step in this direction would be the development of a submersible aircraft carrier; because at the present time and for the foreseeable future, naval air power is and will be a significant deterrent to an enemy, not only against his commencing small wars, but also against his precipitating large ones. This is due to the naval aircraft's capability of carrying either conventional weapons or nuclear weapons from a mobile base to a scene of action in a very short time, thereby threatening prompt retaliation in force against any aggressive move by an enemy.

The principal advantage to be gained from a submerged navy is the immensely increased secrecy of location of fleet units at sea. Obviously one of the greatest assets of the nuclear submarine today is its ability to steam (a strange word to the ears of any World War II and previous submariner!) for thousands of miles, even around the world, without surfacing /12/. Secrecy of position is an invaluable asset both for offense and defense; and for defense particularly because the enemy, having essentially no target at which to shoot his missile or on which to drop his nuclear bomb, is unlikely to start an all-out nuclear war knowing that nearly all of the U.S. Navy would be unscathed after the first blow.

Another advantage to be gained by having a submersible fleet is the

[20]Inner space That portion of the world which is between the surface of the ocean and the ocean floor.

ability of each ship to move in three dimensions. This feature gives the submersible more places to "hide", either from attack, or in preparation for launching an attack. At the present time submarines capable of carrying large crews are restricted to a relatively shallow volume of water near the surface of the world's oceans; some day, it is believed, submarines will be developed which will be able to withstand the 16,000 pounds per square inch pressure of the deepest ocean depth -- 35,800 feet.[21]

Even so, today's submarines are difficult to detect, not only because of their capability to move in three dimensions, but because of the characteristics inherent in the medium they traverse: water. Sound is at present the principal means of detecting submerged objects, and volumes have been written on the phenomena of transmission of sound in the sea./2/ Yet the vagaries of sound in the sea are such that today if one destroyer and one submarine (with equally well-trained crews) should be pitted against one another in battle, the submarine has the more chance of coming out the winner, largely because the destroyer is so likely to lose sound contact with its target.

Another advantage of a submerged fleet would be increased protection from fallout from a nuclear burst. Whereas avoidance of the radioactive cloud produced by any type of a nuclear burst is a major factor in the tactics employed by surface ships under nuclear attack, it is almost a negligible item for submarines for the following reasons:

1. The initial radiation effects from a burst do not penetrate water as easily as they go through air./15/

[21]The Challenger Deep of the Marianas Trench, 250 miles southwest of Guam.

2. While radioactive particles from the burst do submerge in the water, the water attenuates this radiation, so that a submarine experiences less exposure to radiation than a ship on the surface./15/

3. The thick pressure hull of a submarine provides additional protection against those radioactive particles or rays which might reach the outer skin of the submarine.

Among the disadvantages that submersible ships have is more susceptibility to shock damage at deep submergence when compared to surface warships. This is true no matter what type of explosion causes the shock wave; and, of course, nuclear explosions have a tremendous ability to produce shock. Add to this disadvantage the further fact that underwater nuclear explosions have greater peak overpressures at a given range than air or surface detonations (Table 5), and it is readily apparent that it will not be desirable to have submersible ships at deep submergence if an underwater nuclear burst in the vicinity is a distinct possibility.

TABLE 5

Peak Overpressures for 1 MT and 20 MT Bursts (in psi)[22]

MT	Range	Air Burst	Surface Burst	Deep Underwater Burst[23]
1	5 miles	3	2	1,900
20	5 miles	10	10	5,149
1	1 mile	20	40	30,000
20	1 mile	35	100	81,300

[22]Extracted from /11/, pp. 97, 120 and 146.

[23]The effect of these large underwater overpressures is reduced to a large degree by two facts:

Since the lethal area of the underwater nuclear burst spreads conically toward the bottom[24], a submarine is less susceptible to shock at shallow depths, and indeed is safer when so situated than is a surface ship at an equal distance from the same explosion. For this reason, then, it may be decided that a submerged fleet needs only a shallow submergence capability to successfully carry out its mission.

One further disadvantage to an all-submarine navy might exist in the problem of inducing enough personnel to volunteer for this type of duty. Also, if the present policy of disbursing extra hazardous duty pay to submariners was continued in this situation, pay costs would be increased tremendously.

A thesis could be developed which would study this idea of a submerged fleet in more detail; there may well be many other problems connected with such a scheme that are not mentioned here.

1. The duration of the shock wave in water is shorter than in air.
2. The "surface cutoff", or sharp decrease in the water shock pressure at a point below the surface, is caused by the combination of the direct pressure wave with the negative pressure wave reflected from the surface of the water /15, page 282/.

[24]D.J. Carrison, "Defense Against Nuclear Attack At Sea," U.S. Naval Institute Proceedings, XC (May, 1964), 42.

CHAPTER V

DEFENSE OF BASES AND CONTROL CENTERS[25]

GENERAL

A.E. Sokol, in his book on seapower /10/, has the following to say about bases:

> A currently widespread opinion is that naval bases have lost much of their former importance as one of the essential elements of sea power. It is argued that with a growing radius of action for individual ships, the development of a mobile logistic fleet support, and even more with the coming use of nuclear power for ship propulsion, the need for strategically located sites for refueling, or to provide shelter, act as sources of supply, repair, recreation, and so on, is inevitably shrinking, while fixed bases are increasingly hard to defend against attack with modern means.
>
> Such opinions are due to a somewhat narrow definition of the functions of bases and fail to see the problem in the proper light. To realize the true significance of bases we must give them a broader and more inclusive definition than is common.
>
> First of all, we must consider as "bases" all the points in which sea power meets the land, or vice versa; any locality in which the two interchange their resources or affect each other in any way, must be regarded as a potential base, be it a natural harbor or an artificially created landing place or roadstead.
>
> Considered in this light, the main role of bases may be stated as including the performance of the following tasks and services:
>
> 1. Enable or facilitate contacts between ships and land.
> 2. Act as foci of power as close to the enemy as possible.
> 3. Provide centers of supply, repair, recreation, etc., and shelter for ships.
> 4. Serve as parts of a system of screens to warn against attacks.
> 5. Help in the control of shipping.
>
> Sea power does not, of course, exist for its own sake; it must always, in one way or another, serve the land from which ultimately it draws its strength and to which sooner or later, it must return. For sea power is and must be a projection of land power,

[25]Except as specifically noted, the discussion concerning bases will be considered as applying equally to control centers.

> a means of connecting lands separated from each other by sea, or most easily accessible by water. To deny it contact with the land would mean to frustrate sea power and make it sterile /10, pp. 161-2/.

Thus bases are still indispensable as regards support of the fleet. But the fact that they are fixed installations renders them very susceptible to attack by bomb or missile. If these bases are to survive, at least in part, an all-out nuclear attack, consideration must be given to increasing their protection against nuclear explosions.

As previously, the alternatives range from dismantling (which would be a logical consequence of complete disarmament) to completely hardened installations, able to withstand a direct hit by the most powerful weapon available to an enemy. Of course, the cost of this latter extreme measure would be nearly infinite, so again the discussion will concentrate on the middle areas.

ALTERNATIVE 10 - NO CHANGE

Most of our naval bases were constructed during or prior to World War II, and the buildings and equipment were not designed to withstand the extreme blast pressures and heat produced by nuclear explosions. Therefore, if nothing is done to improve these structures' ability to resist shock and intense heat, a few nuclear weapons of one megaton size accurately placed on these vulnerable targets would render the fleet nearly useless, even if all of the ships were clear of the bases and so were undamaged.

Thus, in order to overcome this situation, there are three alternatives that may be examined: (1) dispersal, (2) mobility, and (3) hardening of bases. Any of these may be accomplished in part or in whole, and the cost would depend upon the degree to which the particular measure

is taken.

ALTERNATIVE 11 - DISPERSAL OF BASES AND FACILITIES

(This is a parallel proposal to Alternative 6, Even Distribution of Home Ports, for ships; and much of what is discussed previously is applicable in Alternative 11 also.)

If Alternative 6 should be adopted, then dispersal of bases would occur as a logical consequence. Of course, the ships, being mobile, can be ordered to a particular port on short notice and without shore support; but if the relocation is to be permanent, then eventually a shore station (base) must be established in the new port. Such establishment of new facilities takes much time and money, and is perhaps the most knotty problem faced when dispersal plans are considered.

In a Bureau of Naval Personnel publication on passive defense of bases, /5/ it is stated that the task of the enemy (of destroying our bases) can be made more difficult by reducing the size of these large targets. Specifically, it states:

> If, for example, by duplicating a critical activity, we can force the enemy to expend two weapons instead of one, then our protective program is effective.

Although this statement appears to apply to duplication of an activity, the general result is also applicable to the situation where an activity is divided up and its components relocated at some distance from each other without necessarily duplicating the activity's tasks. However, it may be desirable to duplicate control centers for the purpose of insuring that coordination of retaliatory effort is not lost in the event of nuclear attack.

Since the advantages and disadvantages of dispersal of bases as

entities has been already discussed under Alternative 6, the only remaining subject to discuss is dispersal of facilities of bases.

Naval shipyards, with their drydocks and complete repair facilities for ships would certainly be prime targets in any nuclear attack. And it is just because of the difficulty of building those same drydocks that any suggestions toward relocation will meet with much opposition. Perhaps, since many of the shop buildings in the shipyard are not presently configured to withstand much abuse by shock, it would be feasible to construct new shops, either located at some distance from the drydocks, or underground to provide the protection now lacking. At any rate, some investigation should be undertaker to ascertain what can be accomplished in way of preventing an entire naval repair base being lost in one blow. With the excellent transportation facilities available today, the relocation of at least some shipyard components at a distance from the docks should not be too restrictive to efficiency in overhauling ships.

Other naval bases and stations also would be decentralized under this alternative. Even if ships were not dispersed under a plan such as proposed in Alternatives 5 and 6, consideration may here be given to dispersing the activities of a naval base for its own protection. Again, the capability of rapid transit that is available today is the big factor that makes this dispersion feasible.

The main disadvantage of dispersal of facilities is probably the loss of man-hours of work; man-hours which would be expended in travelling from one base activity to another. Running a close second is the disadvantage of having to procure additional land on which to place these activities and the appropriations required to do the job. A thesis in this area could investigate the cost effectiveness of distributing the

various activities of a naval base to points far enough apart so that one nuclear weapon would be able to destroy or damage only a percentage of the base's activities.

ALTERNATIVE 12 - MOBILITY OF BASES

An additional means of dispersal would be provided by mobile bases or mobile facilities. This can be viewed in two ways:

1. The mobile logistic support or service force of ships which provide replenishment at sea.
2. Mobile installations which can be readily transported from one location to another on shore to provide support from the land wherever needed.

Defense of ships in 1. would be of the same type as that considered in Chapter IV. Defense of mobile facilities in 2. would be by their dispersal primarily, with utilization of caves, trenches, terrain profile, temporary concrete shelters, etc. as additional protection at any locality chosen as a temporary place of operation of the facility.

The advantage of mobile logistic support or bases is, of course, the fact that they cannot be pinpointed as targets. Also, by their mobility they may in many instances reduce delivery time of items required by the fleet unit they serve.

The principal disadvantage, particularly of the shore mobile facility, is the necessity of having operations and administration interrupted by orders to move, often on short notice.

The advantages and disadvantages of dispersal discussed under Alternative 11 also apply to this alternative.

ALTERNATIVE 13 - HARDENING OF BASES

The next alternative toward complete protection of bases is that of hardening them. This ranges all the way from just having a few selected features fabricated to withstand nuclear detonations to having the absolutely complete hardness described previously. And of course, the process of hardening would apply to the new bases as well as the old. Again, Sokol says:

> New methods of base defense must be found and developed, with shelters proof against nuclear weapons, such as deep caves dug into mountain sides or submarine pens of reinforced concrete, to offer fleet units a degree of security./10/

As regards the suggestion on caves, this would be a particularly good method since tunnel-type structures are very resistant to heavy shock. Reference /6/ states that tunnels in solid rock are difficult to destroy by nuclear weapons and that use of linings on the tunnel walls reduces spalling (breaking off of chips or slabs) of the rock when the shock wave reaches the tunnel. The difficulty of tunnel construction for U.S. Navy defense purposes is that there are not many geographical locations in the United States which would be ideal for this type of shelter. Sweden, with a topography well-suited for large tunnels, has invested heavily in tunnel-type shelters for its Navy in the years since World War II./4/

Possibly the best location in this country for such means of defense would be in the cliffs lining the fjords of Alaska; but the problem of supporting such bases could be nasty because of the few transportation facilities available at present. Even if transportation to Alaska were improved, the distance to these bases from present centers of naval activities would be very great. However, this disadvantage

due to transportation should be weighed against the additional dispersal that would be gained by spreading bases (and ships) along the Alaskan coast as well as the coasts of California, Oregon and Washington.

Other disadvantages of an Alaskan location would be the possibility of harbors freezing over in winter and the navigational hazard of icebergs which break from glaciers during summer.

The submarine pens of reinforced concrete (and similar structures which might be devised for surface ships) demonstrated their worth as defensive instruments during the heavy Allied bombing raids of World War II. These shelters had walls and partitions three feet thick, and overhead was 20 feet of reinforced concrete which so protected the submarines and their repair shops that work could go on without a break under the heaviest air attack.[26]

The cost of the reinforced concrete alone for a submarine pen which held 36 submarines was $50,000,000 in 1943[27]; today's cost for such a structure would be increased by an amount comparable to the increase of all construction costs over the past 20 years. And so the cost of a "pen" large enough to accommodate a number of surface ships would be of such magnitude, more than likely, as to deter even the most liberal-minded government budget official. A thesis in this area might well investigate the cost effectiveness of such structures for surface ships, aircraft, and submarines of the U.S. Navy vis-a-vis the deep caves in cliffs plan or even vis-a-vis ordinary dispersal.

[26]H. Schaeffer, U-Boat 977 (New York: W.W. Norton & Company, Inc., 1952), p. 136.

[27]Ibid.

Along with this idea of reinforced concrete shelters for ships goes the plan to provide improved shelter for shore-based facilities. Detailed discussion of this problem is found in Chapter 11 of Reference /5/ which says the following under the topic of strengthened construction:

> Sometimes dispersion and duplication are neither feasible nor entirely adequate. Under these conditions it will be necessary to provide protection by increasing the structural resistance of structures. Generally, this is considered the least desirable means of protection because of the extreme cost of making existing structures more resistant to the high blast overpressures of nuclear explosions.
>
> The resistance of all structures may be materially increased at no appreciable increase in cost if the requirement to resist blast is considered during the design phase. For instance, the maintenance of continuity of steel over columns, to provide for reversal of stresses, does not increase the cost of the structure, but will add considerable resistance....
>
> Protection (especially with pressures above five psi) of an existing facility is a most difficult task. Such protection is not only expensive, but sometimes impossible to achieve. Even if possible of attainment, this method of protection should be undertaken only when the facility cannot be relocated outside a target area....
>
> Depending upon spans, dimensions, shapes, and certain other factors, aboveground construction becomes unfeasible at pressures of approximately 30 to 40 psi. Buried or underground construction is then an alternate method of protection.
>
> The cost of protection for a new structure will be governed generally by the blast pressures obtained from target analysis....
>
> For pressures up to about two psi, the necessary degree of protection may be obtained by the application of the principles of slanting construction[28] at an average added cost of approximately five percent. The cost of protection for other pressures and arrangements of framing may be estimated from the data contained in table 11-1. These factors pertain to new construction and cover the cost of the structure only; they do not include the cost of equipment, services, or appurtenances.

[28]Reference /5/ defines slanting construction as the designing and building of new permanent-type structures which can better withstand attack and which can be converted easily at some future time to personnel protective shelters.

TABLE 11-1

Factors by which cost of conventional construction should be multiplied to obtain the cost of new aboveground construction for providing protection under various blast pressures:

Maximum clear span in structure (in feet)	Peak Overpressure (psi)					
	2	5	10	25	50	100
20	1.0	1.2	1.5	2.4	3.0	3.6
40	1.02	1.4	1.8	2.8	3.6	4.4
60	1.05	1.6	2.0	3.2	4 2	5.2
80	1.08	1.8	2.2	3.6	4.8	6.0
100	1.10	2.0	2.4	4.0	5.4	6.8

In estimating the cost of protection to existing facilities, the factors given in table 11-1 should be increased by 50 percent.

In certain instances and for pressures in excess of 25 psi, the cost of a buried structure may be somewhat less than that of a surface structure. Where topography and ground water conditions permit, the costs of underground construction may be estimated as 25 percent less than those given in table 11-1 for surface structures....

Ordinarily, communication and transmission towers can withstand pressures up to ten psi. For higher pressure levels, consideration should be given to additional guys to existing towers, provision of emergency replacements, such as readily erected hinged poles, or relocating the towers....

Waterfront structures, such as piers, wharves, and graving docks, will generally withstand blast pressures in excess of those for which it is feasible to design supporting buildings....

It is readily apparent from these considerations that aboveground blast-resistant structures will be difficult to achieve, whether they are reinforced older buildings, towers, etc., or newly constructed buildings specifically designed to withstand the high overpressures and extreme drag loading created by nuclear bursts. If it is desired that a particular structure withstand more than 25 psi overpressure, which pressure would be exerted by a typical 100 MT surface burst at a range of 5.5 miles from ground zero, then it will be safer and possibly more economical to build the structure underground or to bury it.

CHAPTER VI

SUMMARY

GENERAL

It will be the purpose of this summary to provide a brief resume' of the foregoing alternatives, restating their salient points and attempting to place some relative standing of importance to each one. Although some recommendations are included here, one of the chief purposes of this thesis is to provide a foundation stone for other, more detailed theses in the future; therefore a list of derived thesis topics is presented in Appendix D. In essence then, Appendix D serves as the list of principal recommendations of this thesis.

SHIPS IN PORT

The best means of passive defense against surprise nuclear attack is, at the present time, dispersal. Therefore it is believed that equal distribution of ships in home ports (Alternative 5) together with staggered in-port periods (Alternative 4) constitute the optimal plan of defense that can be instituted in a short time at relatively low cost. Adoption of these alternatives would result in significantly less numbers of ships in the major home ports, and no one day of the week or period of the year would be a time in which an enemy could rely on high probability of many immobile targets in a small area. Certainly the very least that should be accomplished is Alternative 4 in order to equalize numbers of ships in port on any given day of the week.

Probably the best defense posture could be obtained by adoption of an even distribution of home ports (Alternative 6), but this alternative

is ostensibly an expensive and complicated undertaking, and therefore much more extensive research will have to be performed on all its facets before a knowledgeable decision on its acceptability can be made.

Alternative 8, keeping ships at sea as much as possible by use of two crews for each ship, could be considered as a very acceptable choice if the problem of obtaining and keeping personnel could be met. That is, if the Navy had unlimited personnel resources, keeping ships at sea would provide both optimum readiness and defense against surprise nuclear attack.

SHIPS AT SEA

For the time being, the dispersed formation or disposition will be the best alternative for defense of ships at sea. While the idea of a submerged Navy has much merit, it is a long range plan which would consume many years in transition and would have to overcome many obstacles (legislation, appropriations, development of capabilities, public acceptance, volunteer personnel, etc.) before attaining 100% completion.

BASES AND CONTROL CENTERS

Dispersal, as outlined in Alternative 11 (and 6), would appear to be the best defense plan for fixed installations since it involves no extra costs in construction for hardness (although this hardness feature could of course be incorporated into dispersed new construction if funds permit). Underground or tunnel-type installations would be extremely useful in certain localities and should be seriously considered should cold war tensions mount. Control center construction should employ a combination of the two alternatives by being fully hardened and dispersed underground sites with all necessary facilities for surviving for a period of time in a completely isolated condition.

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APPENDIX A

COMPARISON OF OPERATIONS OF U.S. PACIFIC FLEET DESTROYERS
(PRESENT VS. DISPERSED SITUATIONS)

PRESENT SITUATION

ORGANIZATION

As of 1 April 1964 there were 144 destroyer type ships in the Pacific Fleet of which 13 were in commission, in reserve destroyers (DD) and destroyer escorts (DE) assigned to training of reserve personnel, and 12 were radar picket destroyer escorts (DER) assigned to the Pacific barrier patrol. The remaining 119 ships are organized into five flotillas consisting of 13 destroyer squadrons (DESRONS) with two divisions in each squadron (two squadrons have three divisions), and one escort squadron (CORTRON) consisting of seven DE.[29] There are usually four ships in each destroyer division (DESDIV); and each squadron usually includes one or two guided missile destroyers (DLG or DDG) and one radar picket destroyer (DDR).

For the comparison in this Appendix, only the operations of the 11 DD and one DE squadrons based on the west coast of the United States will be considered unless specifically stated otherwise.

BASES

San Diego and Long Beach, California are the two principal bases of these ships; the escort squadron and six destroyer squadrons are homeported at San Diego and five destroyer squadrons are at Long Beach. One of the remaining DESRONS is based at Pearl Harbor, Hawaii; the other at Yokosuka, Japan.

[29]This organization is presently in process of change.

DEPLOYMENTS

The 11 DESRONS, together with the three DESDIVS of the Pearl Harbor based squadron, rotate on assignment to the Seventh Fleet in the Western Pacific area (WESTPAC); there are at least three squadrons of DD on these extended deployments at all times. The deployments are normally five months on station in WESTPAC which means six months out of home port for each ship. There are approximately 14 months between the completion of one deployment and the beginning of the next for any one ship. Over a five year span, this results in about 670 crossings (one way) of the Pacific Ocean by DD alone.

OPERATIONS

Destroyers in Eastern Pacific ports generally operate on a Monday to Friday basis; and the usual rotation is two weeks of operations at sea followed by two weeks upkeep in port; then two weeks operations, etc. Interspersed in this normal cycle are periods of providing services to various other commands (plane guard, RDT&E project operations, school ship --- engineering, gunnery, ASW, etc.) and large scale AAW and ASW exercises (lasting one to three weeks). As indicated in Chapter III, the tempo of operations is such that ships usually have about six weeks of operations and seven weeks of upkeep or in-port training each quarter.

These ships conduct their operations and training exercises in a large ocean area to the west of the Pacific coastline between Long Beach and San Diego. This operating area is known as the Southern California Fleet Operating Area and has been divided into lettered and numbered subareas to provide training space for all types of ships and all types

of exercises. These areas are located such that destroyers require two to four hours to reach their assigned subarea after departure from port. Large scale exercises involving many ships are conducted in the westernmost portion of the area, or in the open ocean off the entire west coast of the United States.

ASW exercises are conducted as close to San Diego as feasible since all submarines based on the west coast are homeported there. These submarines then can provide services to destroyers (and others) without losing much time in transit to operating areas.

Gunnery exercises, both antiaircraft and surface, are held in this area off Southern California; merchant ships and most small craft steer well clear of the area when such exercises are being conducted. Target services for both kinds of exercises are obtained from convenient bases in and near San Diego.

Other exercises to round out a ship's training syllabus are conducted by the destroyers singly, in pairs, and often by divisions during day and night. Observers for exercises conducted in competition with other destroyers and observers for speed trials are obtained from other ships in own division or squadron.

TRAINING

Refresher training, an intense, major training period which is scheduled immediately following regular overhauls, is conducted for all ships at San Diego under the cognizance of Commander, Fleet Training Group. Missile firing for destroyers so equipped is done on the Pacific Missile Range which extends southward from Point Mugu, California.

For individual ship's personnel, or integral ship's teams such as the ASW team, CIC team, etc., there are fleet schools in Long Beach and San Diego. There is little or no cost of travel involved because of the nearness of these activities to the majority of the destroyer force; and quotas for personnel are easily obtained by telephone in most cases. In addition, there are good transportation facilities between, to and from these two cities when personnel must go to another area for specialized training.

LOGISTICS

Fuel, water, stores and repair parts are readily obtained at Long Beach or San Diego as these ports have excellent ship, rail and truck terminals; and there is also a Naval Supply Center or Depot at each port. Pier space for destroyers is available but insufficient for the number of ships present. Most DD types at San Diego moor to a buoy in the inner harbor.

Ammunition is obtained from the Naval Ammunition Depot at Seal Beach, California (near Long Beach). Mail is handled by local fleet post offices at Long Beach and San Diego, branches of the main fleet post office for the Pacific area which is in San Francisco. For transfer of personnel, there are receiving stations located in both ports.

MAINTENANCE AND REPAIR

During periods of assigned upkeep, ships' maintenance is generally more effective when the ship can be alongside a pier, but as is noted above, pier space is limited for destroyers in these two ports. Repairs beyond the capability of a ship's force will require San Diego ships to go to the Long Beach Naval Shipyard (LBNSY) or possibly to one of the

San Francisco area naval shipyards now that the Naval Repair Facility at San Diego is being disestablished. LBNSY normally handles such repairs for destroyers based there.

Regular overhauls for destroyer type ships, which are three months in duration, can be performed at one of four naval shipyards on the west coast. In addition to LBNSY, which has been mentioned, there are San Francisco Naval Shipyard (SFNSY) and Mare Island Naval Shipyard (MINSY) located in the San Francisco Bay region, and Puget Sound Naval Shipyard (PSNSY) located at Bremerton, Washington. Under normal circumstances, Long Beach DD are assigned overhaul at LBNSY; San Diego DD generally go to SFNSY or MINSY.

DISPERSED SITUATION

ORGANIZATION

Using the same total number of destroyer type ships as in the present situation, 144, the ships are assigned to four flotillas consisting of 18 squadrons with two divisions each; the DE squadrons are not changed. There are seven ships in each squadron; and the in commission, in reserve destroyers are included in the West Coast based squadrons (a temporary measure which would be deleted when sufficient new DLG/DDG are commissioned).

BASES

The ships are assigned bases as follows:

1. One squadron each at:	DLG	DDG	DD	DDR	Total
Guam, M.I.	1		6		7
Subic Bay, Luzon, P.I.	1		5	1	7
Buckner Bay, Okinawa[30]	1		6		7
Sasebo, Japan	1	1	4	1	7
Yokosuka, Japan	1	1	4	1	7

(These ships make up DESFLOT 1)

2. 13 squadrons in the following U.S. ports, each squadron generally consisting of one DLG or DDG, five DD, and one DDR:

DESFLOT 3 --- Port Townsend, Washington

Astoria, Oregon[30]

Newport, Oregon

Coos Bay, Oregon

Gold Beach, Oregon

[30]Flotilla Staff headquarters in this port

DESFLOT 5 --- Eureka, California

San Francisco, California[31]

Monterey, California

Morro Bay, California

DESFLOT 7 --- Santa Barbara, California

Long Beach, California[31]

San Diego, California

Pearl Harbor, Hawaii

The above ports (except Pearl Harbor) are approximately 100 miles apart along the Pacific Coast of the United States as indicated in Figure 2, page 29.

DEPLOYMENTS

There are no deployments required since the ships stationed in WESTPAC ports will provide the necessary destroyer strength for the Seventh Fleet. Transiting is thus reduced to rotation of squadrons.

This rotation would take place about every five years for any given squadron in WESTPAC; the squadron at that time would return to one of the West Coast flotillas for approximately 15 years before being assigned to DESFLOT 1 again. The rotation is for the principal purpose of obtaining regular naval shipyard overhauls for "deployed" ships. Under this plan the number of transits of the Pacific in five years would be about 70 --- slightly more than 10% of the present number.

[31]Flotilla Staff headquarters in this port.

Of course, a five-year period in WESTPAC means that there is a problem of overhauls during this period; but it is expected that the squadrons would go to the overseas home port just after an overhaul and the subsequent refresher training. Therefore only one overhaul would be required in the WESTPAC area. This overhaul could be accomplished by the repair facility at the overseas base, with floating drydocks providing the required drydocking. (With facilities as they presently exist, Okinawa-based ships would have to go to Subic Bay or to one of the ports in Japan).

(The rest of the discussion of this situation will be principally presented as it would pertain to one particular port; e.g., Monterey, California.)

OPERATIONS

In this dispersed situation the destroyers would still use the Southern California operating area; but two new ones would have to be established: one west of Astoria, Oregon, for DESFLOT 3 and one west of San Francisco for DESFLOT 5 ships. The ships could then reach respective areas overnight; that is, no more than 16 knots from 1600 to 0800 the next morning would be required. Large scale exercises would be conducted as before. In addition, certain exercises and ship training could take place in waters adjacent to the home ports; these are those exercises which involve no outside services, i.e., services of aircraft, tug, and target sled, etc.

The present cycle of two weeks operating, two weeks upkeep would be followed. There should be staggering of in-port periods[32] between

[32]See Table 1, page 16.

squadrons in adjacent ports so as to reduce the number of ships in port at any one time to a minimum consistent with the tempo of operations.

For ASW exercises there could be one submarine based at Monterey; certainly some would be at San Francisco. The Fleet Operating Area off San Francisco (Fig. 2) can be reached overnight (six hours from Monterey, 12 hours from Morro Bay at 16 knots).

If the submarine's speed of advance (SOA) is 12 knots or less, it may be necessary to use the San Francisco based SS for most DD services in the San Francisco operating area, with other SS providing the services whenever possible. Example: San Francisco SS provide services Monday and Friday; other ports' SS provide Tuesday through Thursday.

In order to save fuel, however, a better plan would be to have locally based submarines provide services in waters off Monterey for elementary exercises and for pre-submarine exercises, with advanced exercises (such as Composite Training Unit Exercises (COMPTUEX) and others requiring aircraft assistance) being held in the main operating area off San Francisco.

Gunnery exercises for Monterey destroyers would be conducted in the San Francisco operating area; fleet tugs would be stationed at San Francisco together with target sleds and a target repair facility at SFNSY. Since DD's will be at sea a week at a time there will be no difficulty in getting to the area. Difficulty may arise due to the large amount of merchant shipping in the San Francisco area. Air target services would be provided from utility squadron aircraft based at Alameda Naval Air Station.

Other exercises would be accomplished singly or in groups as in the present situation; but they would be conducted almost entirely in an

stores, more flexible departure and return times for personnel liberty (no boating), ease of obtaining fuel and electrical services in addition to water; and it also provides the ships' crews with experience in the seamanship of getting underway and mooring. In Monterey, either a new pier could be constructed or the present one used by the Coast Guard enlarged and strengthened.

There should be a small staff ashore at all times for liaison purposes. It would consist of men on permanent shore duty and could also serve as a recruiting office. A possible contingent would be:

Officer-in-Charge ---- 1 LT/LTJG

Assistant OINC ------ 1 CPO

Operations ---------- 1 quartermaster, 1 radioman (QM1, RM2)

Administration ------ 1 yeoman (YN1)

Supply ------------- 1 storekeeper (SK2)

Assistants --------- 2 seamen (SN)

This staff would be on duty principally when all the ships were absent, and would be specifically on hand to meet them when they returned to port. Since the squadron staff serves additionally as the staff for the first division of the destroyers, it is recommended that this shore staff be a completely separate staff, assisting the squadron staff.

Stores and repair parts could be trucked or sent by rail directly to ships as needed from the Naval Supply Center at Oakland, Calif., but this sort of thing should be minimized. Instead there should be a small warehouse on the pier to receive stores for ships at sea. Receiving and caring for these stores would be one of the chief duties of the storekeeper on the shore staff.

Ammunition would be obtained at the nearest naval ammunition depot;

in the case of Monterey, this would be the Concord depot at Port Chicago on the Sacramento River or its annex at MINSY. Mail could be handled through the local post office, with classified material being sent by registered mail or by courier. For transfer of personnel, public transportation to and from Monterey is fairly adequate.

MAINTENANCE AND REPAIR

Upkeep periods would be of the same duration as in the present situation, but only one division should be in upkeep at a time so that days when all seven ships are in port at once are few. The schedule of Table 1 is a suggested plan; e.g. the schedule for Squadron 1 would be the schedule for Monterey ships, and the schedule of Squadron 2 would be that for San Francisco and Morro Bay ships.

Repairs beyond the capability of a ship's force will require that the ship go to SFNSY or MINSY. Regular overhauls should be performed for Monterey destroyers at SFNSY, MINSY, or at a private shipyard in the Twelfth Naval District.

APPENDIX B

SAMPLE COST ANALYSIS

CHANGING HOME PORT FROM UNITED STATES (WEST COAST) TO JAPAN

To furnish the reader with just a little insight on costs involved in making the home port changes suggested by Alternatives 5 and 6 of Chapter III, the following computations are given for two facets of the situation: personnel transfer costs and fuel costs.

ASSUMPTIONS

1. The type of ship considered is a destroyer (DD-710 class).

2. Transiting speed is 16 knots.

3. Cost of fuel oil is $.0436 per gallon ($2.40 for a 55-gallon barrel).

4. Only the cost of transferring dependents at the time that the home port is changed is considered. The cost of transferring relief personnel and their dependents is not considered; since the men serving in the ship at the time of the change of home port will be travelling on the ship, their cost is considered to be zero.

5. A family with two dependents over 12 years of age and with two under 12 is used in the analysis.

PERSONNEL TRANSFER COST

1.	Cost at present:[33]	0
2.	Cost with change:	
	Cost of air transportation per person:[34]	$160
	Number of fares (2 full, 2 half):	x3
		480
	Cost of shipping household effects (6000 pounds at $30 per hundredweight):	+1800
		2280
	Average number of families per ship:	x50
		114000
	Number of ships:[35]	x70
	Total	$7,980,000

FUEL COST

1.	Gallons of fuel consumed per transit: (650 gals/hr x 24 hrs/day x 15 days/transit)	234,000
2.	Cost per transit: 234,000 x $.0436 per gallon	$10,200
3.	Cost at present time: $10,200 x 670 transits	$6,834,000
4.	Cost with change: $10,200 x 70 transits	$714,000
5.	Savings in fuel cost (4 - 3):	$6,120,000

COST OF CHANGING HOME PORT

Personnel transfer cost less savings in fuel cost: $1,860,000

[33]Assuming no home port change.

[34]Cost of transportation by ship (MSTS) is $300.

[35]Five-year rotation plan. See page 59.

APPENDIX C

SUGGESTION TO ALLEVIATE COST OF NEW BASES

One of the biggest costs and greatest headaches of establishing new home ports under Alternative 6 would be the provision of housing, commissaries, and exchanges for naval personnel and their dependents in each of the ports. Besides the cost of constructing and manning these facilities, there is the fact that they will be competing against the local economy to provide services. Such a situation may cause resentment in the citizens of the host city, particularly in those cities where no military establishment has ever been previously (whereby the civilians are not familiar with the military system of fringe benefits). How, then, could this problem be resolved?

The proposal of this appendix is that no new facilities of this type be constructed, those now existing be eliminated, and the pay of military personnel be increased commensurately to compensate for the loss of these fringe benefits. In addition, dependents' outpatient clinics at naval dispensaries and hospitals would be abolished and an increased Medicare-type program would take their place.

If this were done, the naval service would not have to concern itself with all the problems of supporting the Navy man's family, local economies could be stimulated, and the service families could feel free to have their own family doctor. (The author feels sure that many Navy families would agree that having their own doctor is a far better arrangement, except for the expense, than the present arrangement of providing family clinics at dispensaries and hospitals.)

This means, therefore, that the cost of construction work in

creating a new base is lessened considerably. Eliminating housing, BOQ's, commissaries, exchanges and the like; i.e., limiting the new base construction to essentials such as shops, operations and administration center, pier facilities, etc., would significantly reduce the cost of such new bases.

In addition, increase of pay to compensate for loss of these benefits would tend to make the military pay scale more comparable to the pay scale of business and industry; this fact would certainly be a very powerful means of attracting men to commence or to continue a military career. (It is particularly difficult to try to spell out to a reenlistment prospect the exact monetary advantages of the various fringe benefits; this plan would allow each person to weigh exactly his financial status either as a military man or as a civilian.)

Also, elimination of these services would contribute to the reduction of any tendencies toward governmental control of everything. Is it really necessary that the naval service be in the grocery and department store businesses? For ships at sea, yes; but for most shore stations, no. It is reiterated that the local economies would be tremendously enhanced if the personnel and dependents of the neighboring naval installations came to them for all services.

It should be emphasized that this idea in no way affects the ship's store afloat, medical services on shipboard, or naval hospitals. These services are absolutely necessary to the well-being and morale of naval personnel and their families.

What magnitude of pay raise is envisioned? Assuming that the average Navy man spends per month the amounts indicated in Table 6, and that the savings are as indicated therein, then the pay increase

should be of the order of the sum of the savings.

TABLE 6

AN INDICATION OF THE VALUE OF TWO FRINGE BENEFITS

	Spent per month	Cost of similar purchases in civilian stores	Savings
Commissary	$150	$175	$25
Exchange[36]	50	75	25
			$50

This increase should be scaled up or down depending on family size, but not by rank or rate.

[36]Includes such services as laundry, dry cleaning, barber shop, cobbler shop, etc.

APPENDIX D

SUMMARY OF SUGGESTED DERIVED THESES